Sampling for Plant Tissue Analysis

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Sampling for Plant Tissue Analysis

Guide A-123

High crop yields of good quality require, among other things, adequate water and plant nutrients. One way to know whether a crop is adequately nourished is to have the plant tissue analyzed. Plant tissue analysis is a service offered by the Soil, Plant, and Water Testing Laboratory of New Mexico State University.

WHAT THE PLANT ANALYSIS SHOWS

Plant analysis shows the nutrient status of plants at the time of sampling. This, in turn, shows whether soil nutrient supplies and applied fertilizers are adequate.

Plant tissue analysis can confirm nutrient deficiencies suspected because of visible symptoms. Not all abnormal appearances are due to a deficiency. Some may be due to either a lack or an excess of certain elements. Symptoms of one deficiency may look like those of another. A plant tissue analysis can pinpoint the cause, if it is nutritional. A plant analysis is of little value if the plants come from the fields that are infested with weeds, insects, disease organisms or if the plants are moisturestressed or mechanically injured.

The most important use of plant analysis is as a monitoring tool for determining the adequacy of current fertilization practices. Sampling a crop periodically during the season or once each year provides a record of its nutrient content that can be used through the growing season or from year to year. With soil test information and a plant analysis report, a producer can tailor fertilization practices closely to specific soil-plant needs.

It may also be possible to prevent nutrient stress in a crop if the plant analysis indicates a potential problem developing early in the season. Corrective measures can be applied during the season or during the next year, if the crop is perennial.

The following elements can be determined on a plant sample by request:

Nitrogen	Magnesium	Zinc
Phosphorus	Sulfur	Manganese
Potassium	Iron	Boron
Calcium	Copper	Sodium

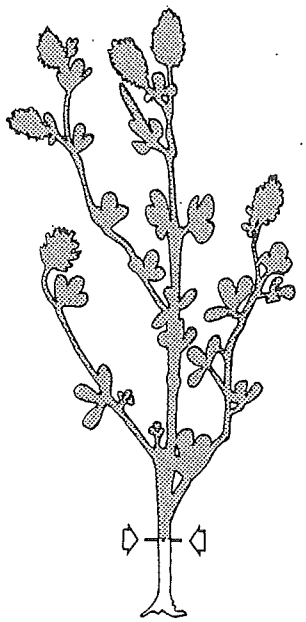
Nutrient elements of greatest importance in New Mexico crops are nitrogen, phosphorus, iron, zinc and manganese.

For accurate plant analysis, considerable care must be taken in collecting, preparing and sending the sample to the laboratory.

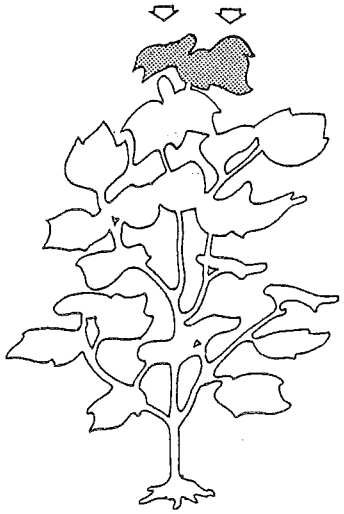
HOW TO SAMPLE

If you suspect a nutrient deficiency: 1) sample when the symptoms first appear, 2) collect similar samples of plant materials from normal as well as abnormal appearing plants from the same field or area, and 3) make sure that the symptoms are not due to some other factors unrelated to plant nutrition.

If the analysis is to serve as a monitoring tool, parts of plants to sample vary with the plant and the stage of growth. The desired sample location from common crops are shown below.

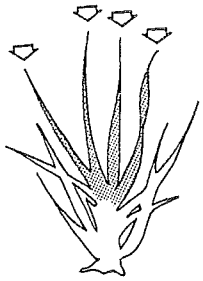


Alfalfa. Collect the entire above-ground portion of the plant at one-tenth bloom stage.

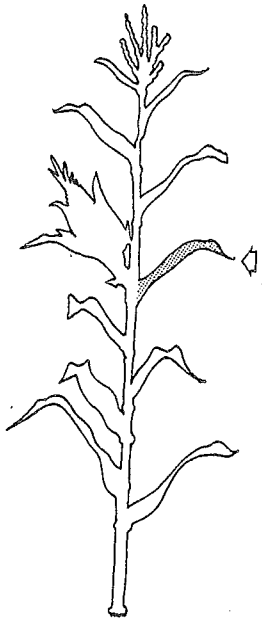


Cotton. Collect the youngest fully mature leaves on the main stem prior to or at first bloom or when first squares appear. For "nitrate only" determination, sample only petioles.

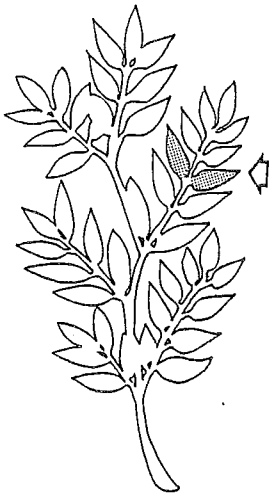
Sorghum. Collect the second leaf from top of plant before or at heading.



Small grains and grass. Collect the four uppermost leaf blades prior to heading if grown for grain, or the entire above-ground portion of the plant if grown for forage.



Corn. Collect the leaf below and opposite the ear from tasseling to silking. Break off leaf at base but do not include the leaf sheath part that is attached to the stalk.



Pecans. Collect 2 to 4 paired mid-leaflets from leaves on the mid-part of either fruiting or non-fruiting current season's growth. The leaves should be located about mid-way up the tree and selected from each of the tree's four quadrants.

TISSUE SAMPLING TECHNIQUES FOR SPECIFIC PLANTS

Crop	When to Sample	Part of Plant to Sample	Number of Plants to Sample
FIELD CROPS			
Alfalfa	At 1/10 bloom stage or before	All above-ground portion of one stem from each plant	45-50
Corn	Seedling stage	All the above-ground portion	25-30
	or		
	Prior to tasseling	The first fully developed leaves from the top	15-20
	or		
	From tasseling to silking	The leaves below and opposite the ear	15-20
Cotton	Prior to or at first bloom or when first squares appear	The youngest fully mature leaves on the main stem. For "nitrate only" determination, sample only petioles.	30-35
Grain Sorghum (Milo)	Before or at heading	Second leaf from top of plant	20-25
Hay, Forage or Pasture Grasses	Before seed head emergence or at the stage for best quality	The 4 uppermost leaf blades	50-60
Peanuts	Before or at bloom stage	Fully developed leaves from the top of the plant	45-50
Small Grains (Wheat, Barley, Oats)	Seedling stage	All above-ground portion	50-75
	or		
	Prior to heading	Four uppermost blades from top of plant	30-40
Soybeans	Seedling stage	All the above-ground portion	20-30
	or		
	Prior to or during initial flowering	The first fully developed leaves from the top	20-30
Sugar Beets	Mid-season	Fully mature leaves midway between the younger center leaves and the oldest leaf whorl on the outside	30-35
GARDEN AND TREE CROPS			
Beans	Seedling stage	Entire above-ground portion	25-30
	or		
	Prior to or during initial flowering	Two or three mature leaves at the top of the plant	25-30
Lettuce	Mid-growth	Youngest mature leaf	30-50
Sweet Potato	Midseason	Third to sixth leaf from growing tip	20-30
	or		
	Before root enlargement	Center mature leaves	25-35
Tomato (Field)	Before or during early bloom stage	Third or fourth leaf from growing tip	20-25
Tomato (Greenhouse)	Throughout growing season	Petiole of fifth leaf from growing tip (fully expanded leaf)	20-25
Apple, Apricot,, Almond, Cherry, Peach, Pear, Plum	Mid-season	Leaves near base of current year's growth	75-100
Grapes	End of bloom period	Petioles from leaves adjacent to fruit clusters	75-100
Pecans	July or August	Two to four paired mid-leaflets on the mid-part of current season's growth taken from each of the tree's four quadrants mid-way up the tree	80-100

SAMPLE PREPARATION

When gathering the tissue sample in the field, use a clean container. A plastic pail or a paper bag works best. Never use a metal container because it may contaminate the sample.

If the plant samples have soil, fertilizer, dust, or spray residues on them, they will need to be cleaned. A dry brush works best but for stubborn residues, wipe the samples with a damp cloth or wash the samples with distilled or deionized water. However, do not prolong the washing or some of the nutrients may be leached out of the tissue.

Air-dry samples in the shade, not in the sun. Place the dried samples into clean paper bags or envelopes for mailing to the laboratory and to prevent contamination. Never place fresh plant tissue samples in plastic bags for mailing. The plastic bags do not allow the samples to dry out and they may decompose.

Mail the samples to:

Soil, Plant, and Water Testing Laboratory
Box 3Q
Agronomy Department
New Mexico State University
Las Cruces, NM 88003

A nominal fee will be charged. Your county Extension agent can provide further details.

INFORMATION NEEDED

When samples are mailed to the laboratory, the following information should be provided:

- Type of crop
- Variety
- Soil type (if known)
- Current crop fertilization and management practices (i.e. stand, kinds and rates of fertilizer, method of fertilizer application)
- Last year's crop fertilization practices and yield
- Irrigation frequency and quality of irrigation water
- Visual appearance of crop
- Insect and disease problems (if any)

This information is necessary for sound interpretation of the plant tissue analysis.

THINGS TO AVOID

Do not sample the following:

- Young emerging leaves, old mature leaves, or seeds. These plant parts usually are not suitable because they are not likely to reflect the nutrient status of the whole plant.
- Diseased or dead plants
- Plants that have insect or mechanical damage
- Plants under stress from too much or too little moisture, or temperature extremes
- A plant showing visual deficiency symptoms unless it is possible to sample normal plants from an adjacent area in the field. Normal plants thus give a reference to help interpret the chemical analysis of the deficient plant sample.

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